serves as a key to a labyrinth of facts, which are all plain and intelligible with its aid." If the author had studied the embryology of the chicken, for instance, and had used this key, and was able to tell the world exactly what the phylogenetic history or the evolution of the chick had been in the past, she would have done what no embryologist has yet been able to do, or even to approximate. So also on page 57, a little original work on worms, insects, and amphibia would have kept her from saying: "The larva of the butterfly, like the larva of the frog, presents the likeness of an adult animal of a lower type; the young frog is a fish, the young butterfly is a worm." S. H. GAGE

CORNELL UNIVERSITY

Elementary Algebra. By J. A. GILLET.

IT is far too common an impression among preparatory students that geometry is that branch of mathematics in which one proves theorems, while in algebra one simply ciphers with letters and solves problems by means of equations. How many students of algebra are accustomed to think of a statement like $A^mA^n=A^{m+n}$ as a theorem which should be enunciated in words with a distinct hypothesis and conclusion, and proved step by step, using definitions, axioms, and previously established laws or theorems? How many teachers insist upon the demonstration of the laws and principles of algebra? How many text-books present these proofs in such a way as to impress the student with the dignity of the science and the stability of its foundation on logic and reasoning? It is true that one great end of algebra is to use literal arithmetic in the application of equations to the solution of problems, but the text-book on algebra which does not present the subject in the form of the elements of true analysis, and the teacher who does not lead the pupil to see that here is the great instrument of analysis, the elements of which he can master only by demonstrating the various laws and principles enunciated, are robbing the rising generation of mental brawn and sinew and depriving the colleges and universities of students prepared to grapple with the analytic problem arising in the higher courses.

There are two extremes to avoid. It is possible to make elementary algebra too formal and too rigid in its proofs. It is possible to make it a mere collection of rules and examples. The author who most skillfully avoids both these extremes is to be commended. Within

fifteen years the pendulum has swung from the first extreme to the second. It is refreshing now to see a successful medium reached in the volume under consideration. It would be too much to say that the best result attainable has been produced, but the product is good. Especially satisfactory are chapters XI, XII, XIV, XVI, XVII. These demonstrations are clearly put and given with the proper ring. Another commendable feature is found in chapter X, where oral and mental work is emphasized. This should be encouraged by all the means and devices suggested in this and the following chapter or wherever possible.

One chapter must be criticised—that on quadratic equations. The solution by factoring is very important and never should be relegated to a note at the end of the chapter, as in many books, but neither should it drive all other processes from the field. In practice it should be used whenever the expression is resolvable into rational factors, but otherwise it becomes too clumsy and complex for beginners. Moreover, the solution by the general formula as usually given affords too good an opportunity to neglect in teaching the meaning and use of a formula, and in developing the theory of quadratic equations as that of higher equations is later to be developed.

UNIVERSITY OF CHICAGO H. E. SLAUGHT

Briot and Bouquet's Elements of Analytical Geometry. Werner School Book Company.

THIS work is a translation, by James Harrington Boyd, instructor in mathematics in the University of Chicago, of the fourteenth edition of the popular French treatise of Briot and Bouquet.

Those who have read the works of French authors to any extent must have observed the remarkable manner in which they combine scientific accuracy and generality of treatment with easy and popular diction. They have the happy faculty of bringing out the salient points of an abstruse subject by a clear and even flow of language that dissolves all difficulties and makes the subject easy and fascinating. This has been explained by the fact that such treatises have not been prepared for the sake of writing text-books, but are often the reproduction of lectures whose language has been subject to continual processes of polishing and revision in the effort of the lecturer to convey his thoughts to his students most simply and directly.